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Solar Energy Research Institute
(SERI) : plans and objectives

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SOLAR ENERGY RESEARCH INSTITUTE (SERI)
PLANS AND OBJECTIVES

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DEPARTMENT OF ENERGY
LARGE SOLAR CENTRAL POWER SYSTEMS

SEMI-ANNUAL REVIEW
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SOLAR ENERGY RESEARCH INSTITUTE (SERI)
PLANS AND OBJECTIVES

by

Neil H. Woodley, Chief
Systems Analysis Branch

It is a pleasure to be here at the Semi-Annual Review of the DOE Large Solar Central Power Systems Program. SERI was conceived in 1974 when the United States was emerging from the worst fuel shortage that we had seen in peacetime history. Later in 1974, when ERDA began its operations, they commissioned a study to determine what SERI's role should be, its mission and the management methods for the new Institute. Based on the Congressional mandate and the results of those studies, ERDA decided to establish a SERI to provide major national focus and coordination for solar energy research efforts.

Those same studies recommended that instead of being established as a federal laboratory, SERI should be operated by a private entity under contract with the federal government. Accordingly in March 1976 an RFP was issued by ERDA calling for a management plan, a management team, and an initial site with an option for a future site. In July 1976, ERDA received 20 proposals offering sites in 16 states. In March 1977, after evaluation, ERDA awarded Midwest Research Institute the contract to establish and operate SERI in Golden, Colorado.

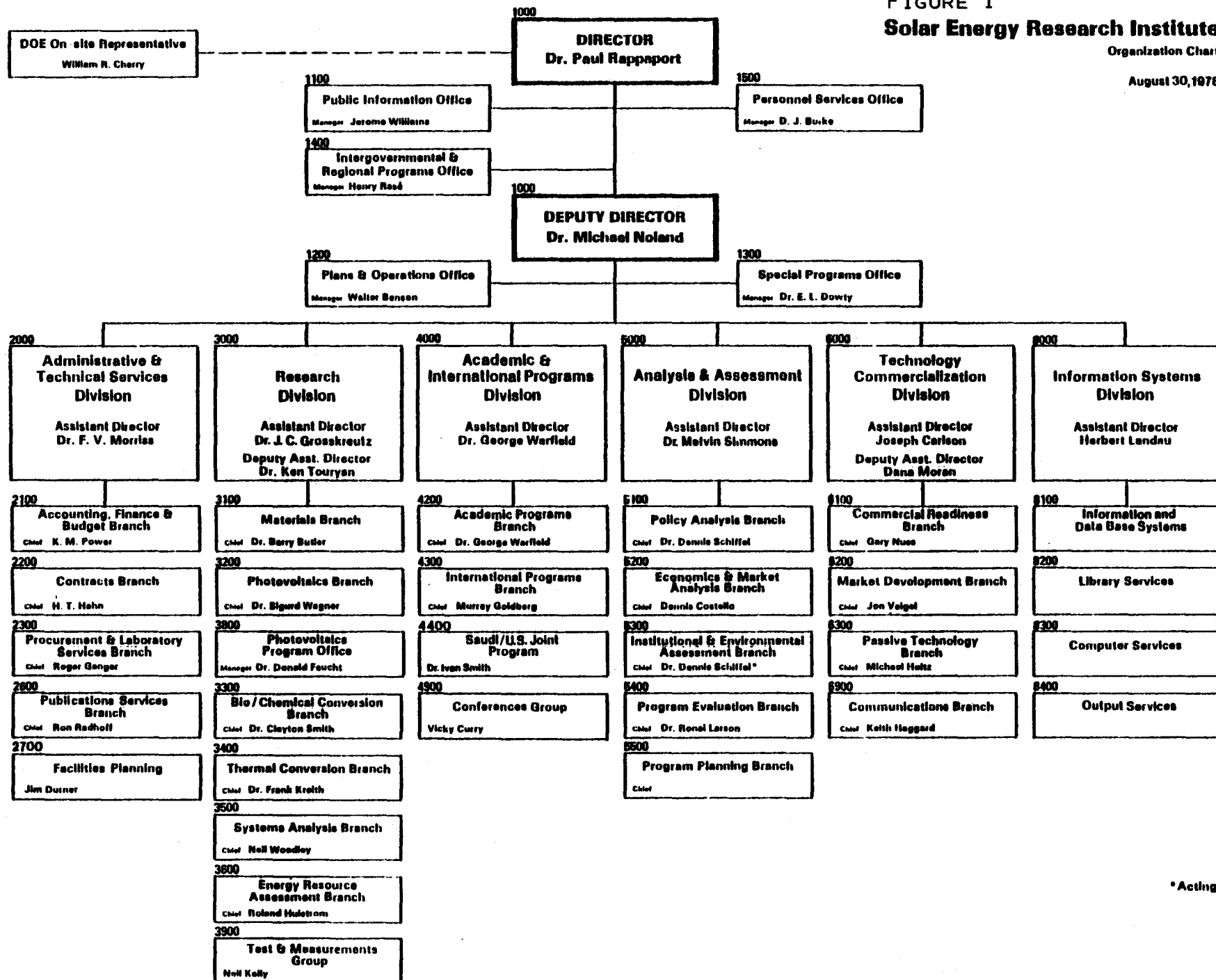
SERI was formally opened on July 5, 1977, and in October 1977 ERDA's function was assumed by the newly created Department of Energy. Since that time probably the most significant event in this chronology was the Sun Day visit of President Carter on May 5, 1978, which exercised the option on the permanent SERI site located on top of what is locally known as South Table Mountain.

Figure 1 shows the current organization of SERI. In a fast growing and evolving organization like SERI such organization charts need frequent updating. The three major divisions in the SERI organization are Research, Analysis and Assessment, and Technology Commercialization. If you think of the

FIGURE 1
Solar Energy Research Institute

Organization Chart

August 30, 1978



* Acting

organization of SERI as somewhat akin to that of a commercial enterprise where ideas and activities are researched (in the Research Division), and their application is speculated, the Analysis and Assessment Division then subjects those concepts and applications to the scrutiny of the social science concerns. With my background of 15 years in the electric utility sector, I know that the social science implications and impacts on technological innovations and applications can be profound. Hopefully this unique aspect of SERI's organization (the Analysis and Assessment Division) is going to avoid for solar energy the pitfalls encountered when the social science aspects have been ignored until it was too late. The third major division is the Technology Commercialization Division, and there is a chronological sequence of events that takes place given a flow of ideas and concepts through the process from research to analysis and assessment to technology commercialization. The three additional divisions shown in Figure 1 perform vital functions in support of this process.

A major accomplishment at SERI is the establishment of a growing and talented technical staff. Evidently the Denver, Colorado location and solar energy research is a winning combination. SERI has processed more than 12,000 applications in the past year, coming in at the rate of 300 to 400 per week. As shown in Figure 2, current projection for SERI staffing is to reach 736 by September 30, 1979 from the current level of 378 projected for the end of this month (September 1978). The status of the SERI organization is summarized as follows:

SERI STATUS

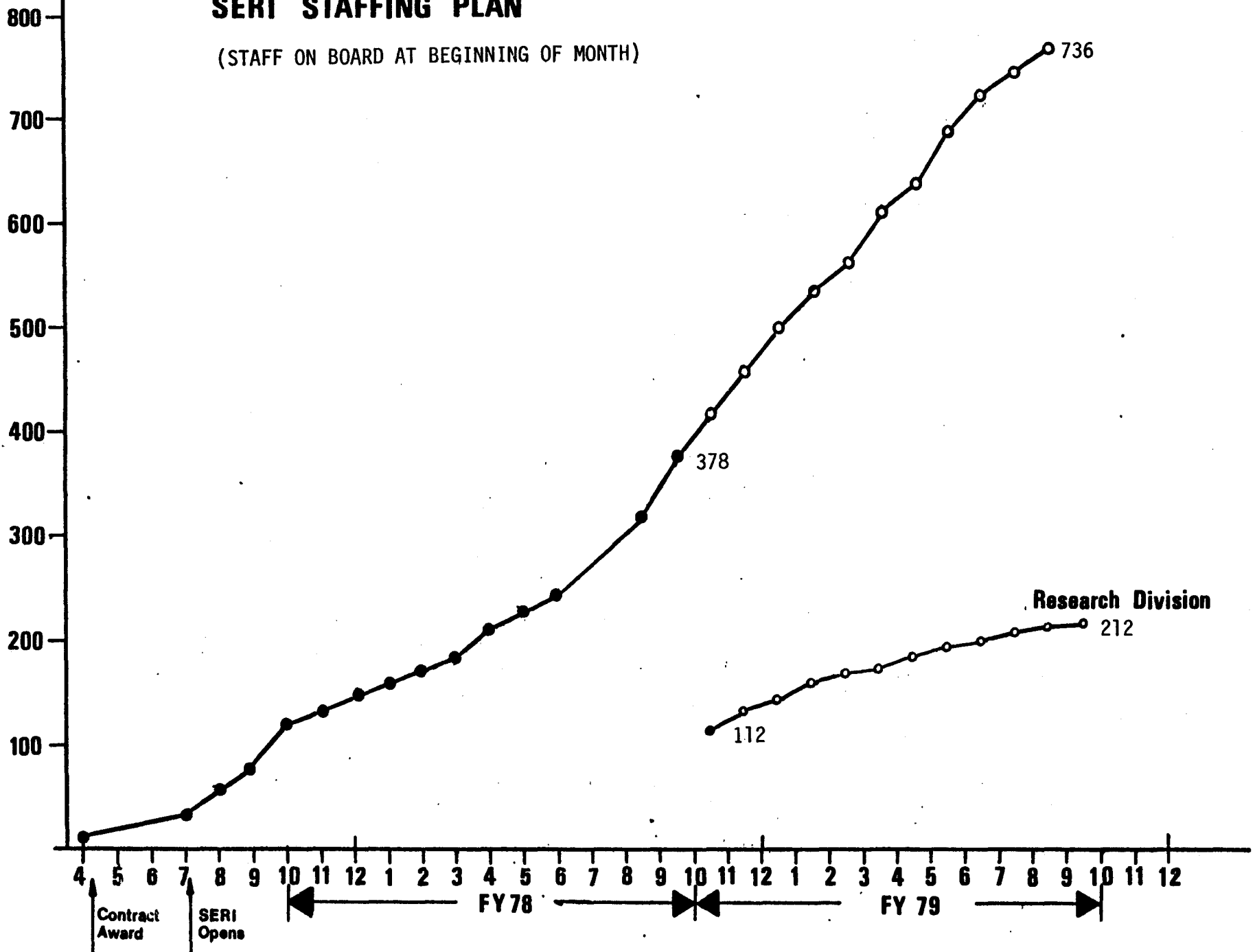
- o Size: 378 by 1 October 1978
- o Growth: To 736 by 1 October 1979
- o Proposed Budget: \$107M for FY79
 - \$ 27M Internal
 - \$ 72M Subcontracts
 - \$ 8M Equipment

FIGURE 2
SERI STAFFING PLAN

(STAFF ON BOARD AT BEGINNING OF MONTH)

STAFF
SIZE

4



The budget for FY79 shown above is divided into 21 major program areas:

SERI MAJOR PROGRAMMATIC AREAS
AND PROPOSED FY79 BUDGET (\$M)

1. Solar Thermal Technology	\$ 2.3
2. Photovoltaic Technology	27.2
3. Clean Fuels from Biomass	5.6
4. Wind Energy Systems	1.7
5. Decentralized Application	3.4
6. Solar Energy Storage Systems	1.0
7. Solar Industrial Process Heat	1.7
8. Passive Technology	3.0
9. OTEC	1.4
10. Basic and Applied Research	5.7
11. Quality Assurance & Standards	2.4
12. Education & Training Programs	0.5
13. Commercialization Activities	2.9
14. Program Management	9.4
15. Test & Measurements Support	2.9
16. Conferences	0.9
17. Solar Energy Planning & Analysis	2.5
18. Information Systems	3.9
19. International Programs	15.8
20. University Research	10.0
21. Economic & Social Science Research	2.1

Materials Research

Since this conference is only concerned with the large solar central power systems, there are two areas of SERI activity I will briefly discuss: materials research and the systems analysis effort. The top ten materials problems in solar research and technology development are:

1. reflector durability;

2. photodegradation of polymers;
3. absorber durability;
4. encapsulants for photovoltaic devices;
5. cost-effective reflector structures;
6. outgassing of polymers, insulation, etc.;
7. corrosion of metals;
8. copper ion degradation of polymers;
9. grain boundary and interface effects in photovoltaic semiconductors;
10. stability of working fluids.

Of these ten problems those that are related to central power systems, and in which SERI has research programs underway or planned for this next year, are as follows:

SERI MATERIALS ACTIVITIES RELATED TO CENTRAL POWER SYSTEMS

- o Materials R&D Planning
 - * Absorber Materials
 - * Reflector Materials
 - * Polymer Materials
- o Materials R&D Projects
 - * Silvered Polymer Mirrors
 - * Silver Alloys for Mirrors
 - * Corrosion Monitoring of Central Receivers
 - * High Temperature Absorbers and Receivers

Systems Analysis

The Systems Analysis effort in central power systems included the recent Solar Thermal Repowering Workshop that many of you attended (August 2-3, 1978, Denver). The workshop provided a thorough review of all of the major study efforts to date relating to the concept of solar thermal central receiver steam supply systems as a means of repowering existing oil and/or natural gas-fired electric generating plants. Working groups comprised of utility, government, and manufacturer attendees discussed the major issues. This also

forms a baseline or cornerstone in the Repowering Strategy Analysis Project which is being conducted at SERI and you will hear Jim Doane, the project manager speak about that after lunch.

Important utility feedback to DOE from the Repowering Workshop included indications that the repowering effort would be the best route to utility acceptance of solar thermal electric technology. It was emphasized that equitable risk sharing is important between utility, government, and manufacturing sectors as participants in any repowering program. The utilities and suppliers alike feel quite strongly that the traditional utility/supplier relationship must be preserved in whatever repowering program is undertaken by the federal government. In order to be successful, a credible near-term market potential is going to have to be demonstrated to the suppliers. Also, early demonstration appears to be imperative because of a perceived "narrow window" for repowering. Plants that are currently being proposed as the best candidates for repowering are existing fossil-fuel plants with anticipated retirement dates some given number of years down the road. One can easily predict that those plants remain viable as repowering candidates for roughly the 1985 to 1995 one-decade "window." The challenge is to successfully bring a new technology, i.e., solar thermal central receiver plants, into the utility marketplace through this rather well defined repowering window. The repowering effort then becomes the launching pad to follow-on stand-alone, and new hybrid plant markets.

The workshop also conveyed that demonstrated operation is necessary before a significant utility commitment to repowering can be expected regardless of what heliostat costs may be predicted to be. Economic viability for repowering must be determined by accomplishment of credible value analyses using methods familiar to and used by utilities. Also, it was noted and emphasized that repowering projects cannot be standardized. They are site specific and highly plant-specific in their design.

The follow-on effort to the repowering workshop is the Repowering Strategy Analysis being performed by SERI. The Strategy Analysis is part of the Planning and Analysis Program Area shown above as one of the SERI program

areas for FY79. It is the aim of the Strategy Analysis to examine several possible courses of action by DOE to pursue the repowering opportunity and determine the effectiveness of each one from the perspective of the total cost to the government weighed against the total benefits accruing to society. The "best" course, assuming there is one, will form the basis of the recommended strategy. Jim Doane, who is the SERI project manager for the Repowering Strategy Analysis Study, is on the program later today and will provide an overview of the project.

In summary, the SERI effort in large solar central power systems is small by comparison with the other major efforts being reported in this conference. Largely limited at present to materials and systems analysis efforts, nevertheless these activities are vital, and it is our goal to make major contributions to this exciting DOE program.



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